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STEREOMICROSCOPE DEVICE FOR TWO OR MORE OBSERVERS
[Stereomikroskopische Einrichtung für zwei und mehr Beobachter]

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The invention relates to a stereomicroscope device consisting of at least two stereomicroscopes with a common object plane and which in the case of surgical operations in particular, allows simultaneous observation of the surgical field by two or more persons. In devices of this kind, a combination of reflectors ensures that the axes of the individual observation beam paths between objective and object virtually coincide. In this manner it is possible, for example, for two observers to view simultaneously even inside body cavities, for example, the auditory canal.

A certain deficiency of the known devices of this kind consists in that the position of the two observers with respect to each other is completely inflexible, which is inconvenient in many operations, namely when the surgeon or the assistant must move to a different position with respect to the patient.

According to the invention, this deficiency is corrected in that the microscopes are arranged so as to rotate jointly around an axis that coincides with the optical axis of one objective.

In a double arrangement in which the two stereomicroscopes are each equipped with a separate objective, the axis of rotation of the overall device runs through the objective of the one microscope.

The device according to the invention can be simplified considerably in that a common primary objective is allocated to the microscopes. Structurally, this primary objective can be allocated to one of the two part-microscopes, and it can also be placed symmetrically between the individual part-microscopes.

The use of a parallel beam path between the individual part-microscopes and the common primary objective is recommended. Then it will be readily possible to rotate the reflectors allocated to the primary objective and to the part-microscopes, jointly with the part-microscopes around the optical axis of the primary objective.

In the figures associated with the invention, several design embodiments are illustrated that will be explained briefly below.

Figure 1 illustrates a side view of a device with two stereomicroscopes with separate objectives;

Figure 2 shows the same side view of an arrangement with a common primary objective, which is structurally allocated to one microscope;

Figure 3 shows an arrangement in which the primary objective is arranged symmetrical to the tubes of the part-microscope

Figure 4 illustrates a similar arrangement with three part-microscopes

Figure 5 shows the arrangement of one beam divider that rotates together with the two part-microscopes;

Figure 6 illustrates the pivoting of the one part-microscope about an axis perpendicular to the common axis of rotation;

Figure 7 is a perspective view of an arrangement according to Figure 3 or 5.

The device illustrated in Figure 1 uses two conventional stereo-surgical microscopes M_1 and M_2, each having a separate primary objective O_1 and O_2. The lighting beams used for incident lighting are combined in the objective G on the common object plane by the semitransparent reflector R_1 and the full reflector R_2. Likewise, the image beams emanating from the object are divided by the two reflectors onto the two part-microscopes M_1 and M_2. The common, slender beam bundle between the object and the first reflector allows observation even of body cavities, for example, of the auditory canal. The axis of rotation of the overall device coincides with the optical axis of the primary objective O_1. The result is that with a rotation, the field of vision into the oculars likewise undergoes only a rotation, but not a displacement.

The arrangement illustrated in Figure 2 shows two part-microscopes M_1 and M_2 that have a common primary objective O_H that is connected structurally to the microscope M_1 on the far side of the reflector R_1. The axis of rotation of the device coincides with the optical axis of the primary objective O_H.

The arrangement illustrated in Figure 3 contains two part-microscopes M_1 and M_2 to which the common primary objective O_H is allocated in a symmetrical arrangement. The reflectors R_3 and R_4 are used in addition to the diverter mirrors R_1 and R_2. The reflector R_4 is semitransparent. The axis of rotation D of the device, which again coincides with the objective O_H, is also the middle axis of the device.

A corresponding arrangement for three part-microscopes M_1, M_2 and M_3 with the additional diverter mirror R_5 is illustrated in Figure 4.

The device according to Figure 5 is a variant of the device according to Figure 3. The beam divider here consists of two penta-prisms with reflection surfaces R_1', R_2'; R_3', R_4', which together with the part-microscopes M_1 or M_2, are arranged so as to rotate about the optical axis of the common primary objective O_H.

Figure 6 illustrates an arrangement according to Figure 3, in which the part-microscope M_2 is arranged so as to pivot about an axis that on the one hand stands perpendicular to the common axis of rotation D and on the other hand is located in the plane of the diverter reflector R_4. The same pivot capacity can also be imparted to microscope M_1 as well.

Finally, Figure 7 shows a design embodiment in a perspective view. The beveled contact surfaces with the diverter mirrors R_1 and R_2 are visible at the housings of the two part-microscopes M_1 and M_2. In the broken surfaces one can see the reflectors R_3 and R_4 of the beam divider, and also the common primary objective O_H; the common axis of rotation of the device coincides with the optical axis of said primary objective.

Claims

1. Stereomicroscope device consisting of at least two stereomicroscopes with a common object plane for simultaneous observing by several persons, characterized in that the microscopes are arranged so as to rotate jointly around an axis that coincides with the optical axis of one objective.

2. Stereomicroscope device according to Claim 1, characterized in that a common primary objective (O_H) is allocated to the microscopes.

3. Stereomicroscope device according to Claim 2, characterized in that the common, primary objective (O_H) is arranged symmetrically between the individual part-microscopes.

4. Stereomicroscope device according to Claims 1, 2 and 3, characterized in that between the individual part-microscopes and the common, primary objective, there is a parallel beam path and in that the reflectors allocated to the two part-microscopes can rotate with the part-microscopes around the optical axis of the primary objective.

5. Stereomicroscope device according to Claims 1 to 4, characterized in that at least one of the part-microscopes can pivot about an axis that stands perpendicular to the common axis of rotation and is arranged in the plane of one of the diverter reflectors (R_4) allocated to the particular part-microscope and in that a transmission is allocated to the reflector that causes a rotation around half the pivot angle of the part-microscope.

Fig.1

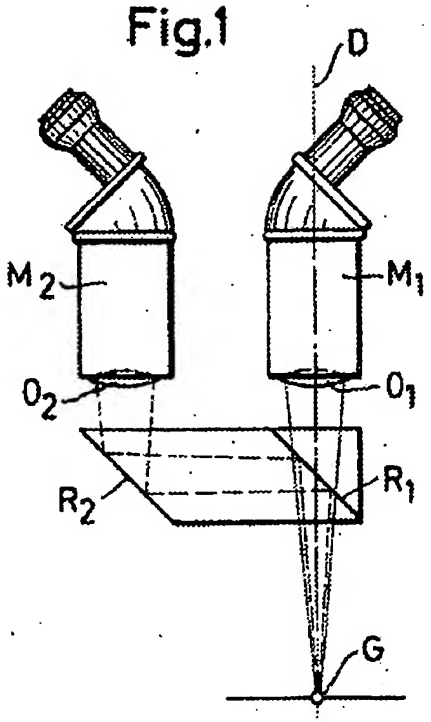
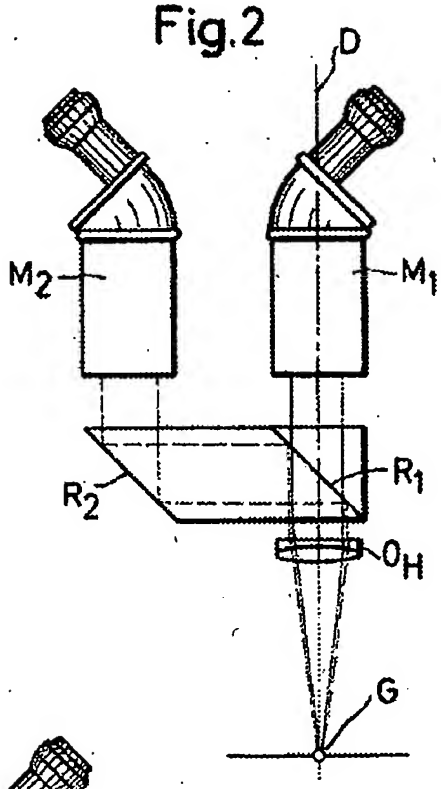


Fig.2



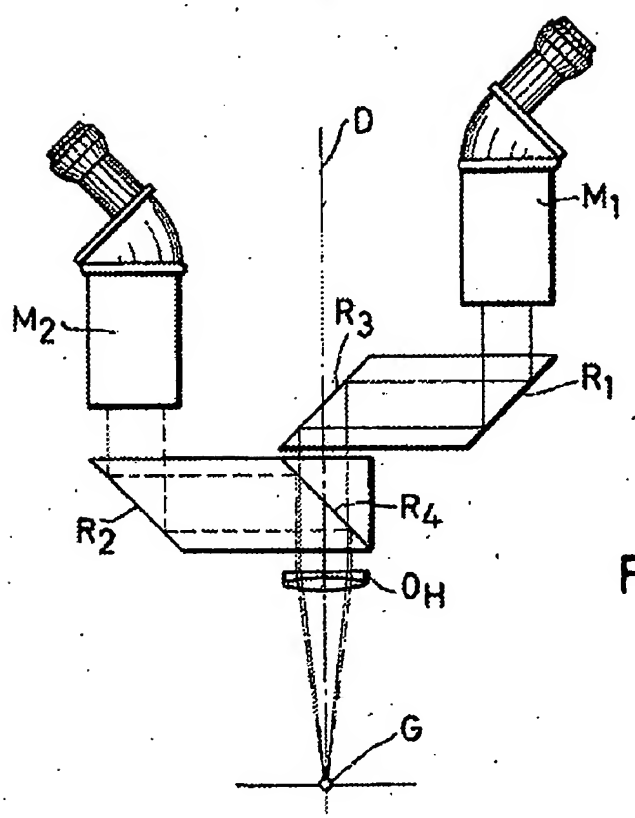
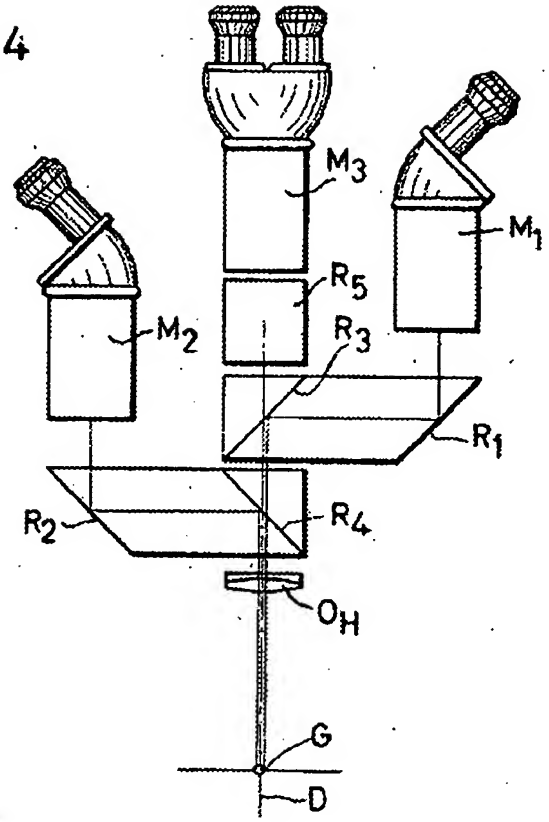


Fig.3

Fig. 4



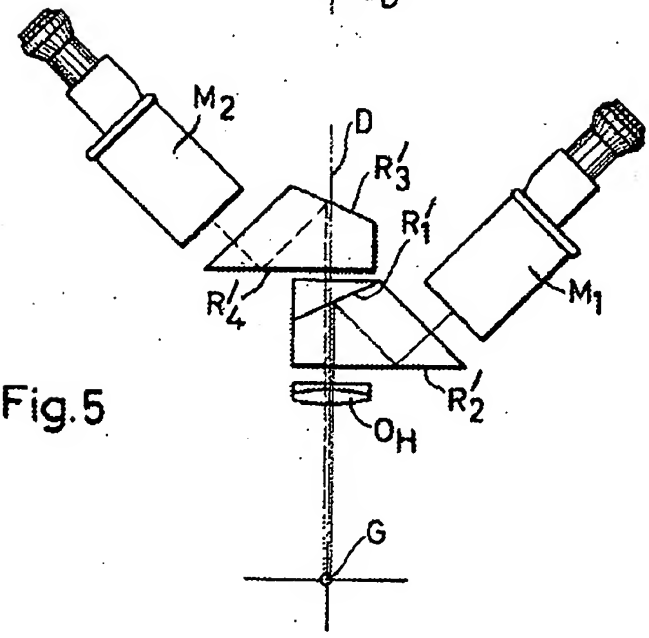


Fig. 5

Fig. 6

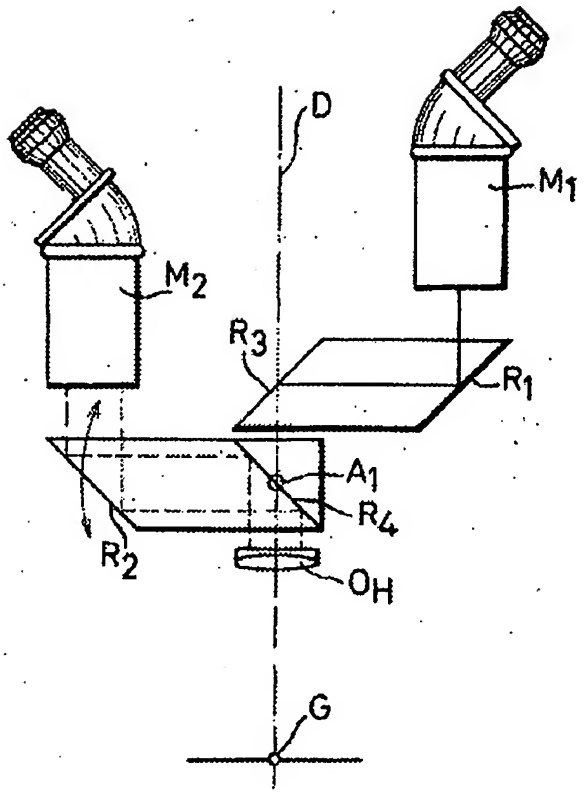


Fig. 7